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asphaltum. Its hardness is between five and six, but it is quite brittle. Its specific gravity is 4.494. It acts slightly on the astatic needle, but is not attracted by the magnet, even when finely powdered. It does not become magnetic on ignition. Difficultly soluble in hydrochloric acid.

Menaccanite is hematite in which part of the iron has been replaced by titanium. Frequently an additional quantity of the iron is replaced by other elements. The amount of iron thus replaced is by no means constant, and hence we have a number of varieties of this mineral, which can be distinguished only by a chemical analysis. With a view to ascertaining the composition of the subject of our note, the writer made an analysis of it.

About two grams of the mineral, reduced to an impalpable powder, were dissolved by a mixture of strong hydrochloric and hydrofluoric acids. This method of solution is much more rapid than by the tedious process of fusion with potassium bi-sulphate, or other fluxes. After complete decomposition of the ore, the hydrofluoric acid must be entirely expelled by heating with pure sulphuric acid. The solution is then made up to a definite quantity. If the heating has caused a partial precipitation of the titanic oxide, it may be brought into solution by fusion with potassium bi-sulphate. The iron, aluminum and titanium, in one-fifth of the solution, were separated and determined by the familiar methods. From the remaining four-fifths of the solution, all the bases, excepting magnesium, calcium and manganese, were separated by means of sodium acetate. From the concentrated filtrate, the manganese was removed by bromine, and calcium and magnesium determined in the usual manner. The result of the analysis is as follows:

Titanic oxide, TiO_2	47.905	per cent.
Ferrous oxide, FeO	34.755	" "
Magnesium oxide, MgO	9.714	" "
Aluminum oxide, Al_2O_3	6.462	" "
Manganous oxide, MnO	1,897	" "
Calcium oxide, CaO	.084	" "
Total	100.817	per cent.

This composition does not correspond with that of any of the varieties given in Dana's Mineralogy, but seems to be near magnesian menaccanite. Efforts to obtain details in regard to the occurrence of our specimens have thus far been unsuccessful. The mineral is of no commercial value, and is interesting chiefly because of the fact that it contains titanium, one of the rarer elements.

BIRDS NEW TO THE FAUNA OF KANSAS, AND BIRDS RARE IN THE STATE.

Captured at Wallace, Kansas, October 12 to 16, 1883.

BY N. S. GOSS, TOPEKA.

Merula migratoria propinqua Ridgw. Western Robin. Saw a flock of seven; killed two.

Zonotrichia gambeli intermedia Ridgw. Intermediate White-Crowned Sparrow. The birds were quite common along the railway, in the ditches and cuts, which afford both food and shelter from the weeds growing and blown in from the plains. Shot several. Prof. D. E. Lantz writes me that he killed one of the birds at Manhattan, October 9, 1883. The Professor is therefore entitled to the credit of adding the birds to our State list. Its capture so far east is a rare find.

Sphyrapicus varius nuchalis Baird. Red-Naped Woodpecker. Killed a pair out of three young birds found in the willows and cottonwoods thinly skirting the South Fork of the Smoky Hill river.

Buteo borealis krideri Hoopes. Krider's Hawk. Killed a female; think I saw another bird, but am not positive, as they so closely resemble at a distance the light phase of *Archibuteo ferrugineus*.

"BIRDS RARE IN THE STATE."

Myiadestes townsendi (Aud.) Caban. Townsend's Solitaire. Saw ten; shot four of the birds.

Dendroeca auduboni (Towns.) Baird. Audubon's Warbler. Shot several; quite common.

Corvus cryptoleucus Couch. White-Necked Raven. Saw a flock of six and one of seven birds; shot three.

I have specimens of the above birds in my collection.

I rejoice to know that we are at last to have a standard classification and nomenclature, as it will in the future do away with the present confusion in arrangements and of names. I shall, in accordance with same, issue a new edition of my Catalogue of the Birds of Kansas.

A CLASS-ROOM EXPERIMENT ON EBULLITION.

BY EDWARD L. NICHOLS, PH. D., OF THE STATE UNIVERSITY.

The change of volume of water between 0° and the boiling-point has been very carefully studied. It is most conveniently expressed by means of the well-known curve, in which the abcissæ are temperatures, and ordinates represent the volumes. Beyond the boiling-point, however, the curve varies with the conditions of the experiment. If boiling takes place without superheating, the change of volume of the liquid and vapor is represented by a vertical line; but if the water be superheated before ebullition occurs, the curve takes a form not yet fully determined.*

Of the behavior of a superheated liquid we know but little aside from the fact shown in Dufour's† and in Donny's‡ well-known experiments, that the temperature may be raised many degrees above the normal boiling-point without ebullition. Those experimenters have shown, what indeed we should expect from the nature of the process of ebullition,§ that in order to prevent boiling it is necessary to have expelled all gases from the body of the liquid. In Dufour's experiment this condition is attained by suspending a globule of previously boiled water in a mixture of olive oil and the oil of cloves, the proportions being such as to give a density to the mixture just equal to that of water. In this way water has been heated to 178° without boiling; and when ebullition does take place the tension of the vapor is sufficient to produce a considerable explosion, sometimes blowing the hot oil from the bath with violence. Donny's method of excluding the air consists in boiling the water in one end of a long and doubly-bent tube; after which, without stopping the ebullition, the other end is sealed in the blast-lamp. In such a tube water may be heated to about 130°, at which temperature explosive boiling takes place, and the tube is generally shattered.

For the purpose of illustrating this interesting phenomenon to his classes, the writer has made use of the following very simple device. In a small "U" tube with unequal

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*Upon this point see James Thomson—Proceedings of British Association, 1871; also, Maxwell's Theory of Heat.

†Bibliothēque Universelle—Archives, 1861, vol. XII.

‡Annales de Chiune, 3d series, vol. XVI, 1871.

§E. L. Nichols—Proceedings of the American Association, 1881; also, Maxwell's Theory of Heat.